

Claims:

1. A method of making a rheology-modified aqueous composition comprising admixing a material or materials whose constituents substantially conform to the proportions of the empirical formula



where M' represents at least one divalent metal cation and m is an amount of from greater than zero to about 8;

where M'' represents at least one trivalent metal cation and n is an amount of from greater than zero to about 6;

where A is an anion or negative-valence radical that is monovalent or polyvalent, and a is an amount of A ions of valence q , provided that if A is monovalent, a is from greater than zero to about 8, and if A is polyvalent, a is from greater than zero to about 4;

where B is a second anion or negative-valence radical that is monovalent or polyvalent, and where b is an amount of B ions of valence r and b is from zero to about 4;

provided $(m+n)$ is greater than or equal to 1;

further provided $qa + br$ cannot be greater than $2m+3n$, and provided that qa cannot equal $2m+3n$;

and still further provided that $(2m+3n+qa+br)$ is less than 3; and

where xH_2O represents excess waters of hydration, with x being zero or more;

with at least a clay and water to form a rheology-modified aqueous composition.

2. The method of Claim 1 wherein M is selected from Groups IA, IIA, VIIB, VIII, IB or IIB of the Periodic Table.

3. The method of Claim 2 wherein M' is selected from Mg, Ca, Mn, Fe, Co, Ni, Cu, and Zn, and M'' is selected from Al, Ga and Fe.
4. The method of Claim 3 wherein the material is a calcined hydrotalcite, hydrotalcite-like compound, or mixture thereof.
5. The method of Claim 4 wherein the calcination is carried out in the presence of greater than about 1,000 ppm of sodium.
6. The method of Claim 5 wherein the calcination is carried out in the presence of greater than about 10,000 ppm of sodium.
7. The method of Claim 1 wherein the material is prepared from a combination of MgO, Al₂O₃ and its hydrates, Mg(OH)₂ and its hydrates, Na₂(CO₃)₂ and its hydrates, Ca(OH)₂, Fe(OH)₂ and its hydrates, hydrotalcite and hydrotalcite-like compounds and their hydrates, and cellulose, which have been calcined together sufficiently to produce the material conforming to the formula of Claim 1.
8. The method of Claim 7 wherein the calcination is carried out by heating at a temperature from about 750°C to about 1500°C.
9. The method of Claim 8 wherein the temperature is from about 900°C to about 1000°C.
10. The method of Claim 1 wherein the clay is selected from bentonite, chlorite, polygorskite, saconite, vermiculite, halloysite, sepiolite, illite, kaolinite, attapulgite, montmorillonite, Fuller's earth, and mixtures thereof.
11. The method of Claim 1 further comprising as components an aluminum oxide, a nitrogen-containing compound, or both.
12. The method of Claim 11 wherein the aluminum oxide is crystalline or amorphous.
13. The method of Claim 11 wherein the nitrogen-containing compound is selected from urea, thiourea, propionamide, acetylamine, amine compounds, and mixtures thereof.

14. The method of Claim 1 wherein the ratio of clay to the material or materials having constituents substantially conforming to the proportions of the empirical formula

$M'_m M'_n (OH)_{(2m+3n+qa+br)} (A^q)_a (B^r)_b \cdot xH_2O$ is from about 99:1 to about 9:1.

15. The method of Claim 11 wherein the amount of aluminum oxide is from about 5 to about 35 weight percent, and the amount of the nitrogen-containing compound is from about 20 to about 120 weight percent, based on the weight of the clay and the dry material or materials conforming to the formula of Claim 1.

16. The method of Claim 1 wherein $(2m+3n+qa+br)$ is less than 2.

17. The method of Claim 16 wherein $(2m+3n+qa+br)$ is less than 1.

18. A dry rheology modification agent comprising a material prepared from a combination of MgO , Al_2O_3 and its hydrates, $Mg(OH)_2$ and its hydrates, $Na_2(CO_3)_2$ and its hydrates, $Ca(OH)_2$, $Fe(OH)_2$ and its hydrates, hydrotalcite and hydrotalcite-like compounds and their hydrates, and cellulose, which have been calcined sufficiently to produce a material conforming to the formula of Claim 1.

19. A dry rheology modification agent comprising a calcined hydrotalcite, hydrotalcite-like compound, or mixture thereof.

20. The agent of Claim 18 or 19 further comprising clay, an aluminum oxide, a nitrogen-containing compound, or a combination thereof.

21. A rheology modified aqueous composition suitable for use in subterranean excavations comprising, as components, a material having an empirical formula as shown in Claim 1, clay and water, and optionally further comprising as components an aluminum oxide, a nitrogen-containing compound, or a combination thereof.

22. The rheology modified aqueous composition of Claim 21 wherein the material is prepared from a combination of MgO , Al_2O_3 and its hydrates, $Mg(OH)_2$ and its hydrates, $Na_2(CO_3)_2$ and its hydrates, $Ca(OH)_2$, $Fe(OH)_2$ and its hydrates,

hydrotalcite and hydrotalcite-like compounds and their hydrates, and cellulose which have been calcined sufficiently to conform to the formula of Claim 1.

23. The composition of Claim 21 wherein the components are present in proportions and at a level of distribution such that the composition is an elastic solid which exhibits stress-dependent fluidity.

24. The composition of Claim 21 wherein the material conforming to Claim 1 is a mixture of magnesium oxide, aluminum oxide (hydroxide), and sodium aluminate.